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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Hiroshi Tamagaki

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EXAMINER

MILLER, JR, JOSEPH ALBERT

ART UNIT

PAPER NUMBER

1792

NOTIFICATION DATE

DELIVERY MODE

11/24/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/551,993	Applicant(s) TAMAGAKI ET AL.	
	Examiner JOSEPH MILLER JR	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 October 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/19/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/19/2009 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then

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narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claims 1 and 18 recite the broad recitation “substrate”, and the claim also recites “a substrate having a film previously formed thereon) which is the narrower statement of the range/limitation.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-3, 6-10 and 12-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taira (JP2001-342556, English computer translation) in view of Schaeffer (6,123,997) and Warnes (2003/0022012).

Taira teaches a process of seeding an alpha alumina layer by preparing the surface using a PVD layer of chrome oxide prior to forming the alumina layer [0003]. The chrome oxide film has the same crystal structure as alpha alumina and therefore is a favorable pretreatment [0006]. Taira teaches the formation of an alpha aluminum film using reactive sputtering at any temperature from room temperature up to 800 degrees C; Taira also teaches the optional inclusion of oxygen [0011-0014].

Taira mentions several times that the purpose of the process is to form an alpha alumina film [Field of the Invention; 0006].

Taira does not explicitly teach treating the surface with a ceramic powder. Taira discusses in some detail [0006] that the crystallinity of the layer prior to depositing the alpha alumina layer by PVD is important to effect the formation of alpha alumina.

Schaeffer teaches a method for forming a thermal barrier coating (abstract). Schaeffer teaches the deposition of a bond coat (col 3, lines 33-38) and then the treatment of the bond coat with alpha alumina particles to substantially cover the surface are in order to drive the formation of a mature alpha alumina film on the bond coat (col 7, lines 20-35).

Warnes teaches a method of forming a thermal barrier including an alumina layer on an aluminide bondcoat (abstract). Warnes teaches the use of a polishing step to apply treat a bondcoat with alumina polishing media [0029].

It would have been obvious to someone of ordinary skill in the art at the time of the invention to apply the alpha alumina particles of Schaeffer using the polishing method of Warnes, as Warnes method would be expected to be an effective manner of polishing/preparing a substrate for growth of alpha alumina

Based on the composite of the teachings of Taira and those of Schaeffer, it would have been obvious to someone of ordinary skill in the art at the time of the invention to apply the method of inoculating the surface of the substrate with alpha alumina particles in lieu of the Cr₂O₃ PVD layer that Taira teaches.

It is noted that:

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a. Taira emphasizes that it's the crystal structure that is important on the surface prior to the PVD deposition of the alpha alumina;

b. Schaeffer teaches that inoculation of the surface serves as a manner of providing a layer of alpha.

While the deposition process of Schaeffer is a higher-temperature oxidation process, one of ordinary skill **interested in a lower temperature deposition process** would be inclined by the composite teachings of the references to form an alumina film using the PVD method of Taira with the surface pre-treatment of Schaeffer. Schaeffer, though teaching an oxidation to form alumina, **also** teaches an alternative process to form a layer of the same crystallinity as alpha alumina, which is described by Taira as the requirement to effectively forming an alpha alumina film.

As argued previously, the step of polishing the surface is held to inherently create surface scratches. [Though Warnes does not explicitly teach the formation of fine scratches on the surface of the substrate prior to film formation, since the steps in the prior art and present claims teach all the same process steps, the results of forming fine scratches on the surface of the substrate obtained by applicants process must necessarily be the same as those obtained by the prior art. Therefore by applying polishing the bondcoat with alumina particles, it must necessarily result in fine scratches on the substrate by Warnes.]

Regarding claim 2, the use of alpha particles is taught by Schaeffer.

Regarding claim 3, Schaeffer teaches the use of alpha alumina particles of 0.3 to 5 microns (col 7, lines 30-35).

Regarding claim 6, as noted above, Warnes teaches polishing [0029].

Regarding claim 7, Warnes teaches the use of vibration [0029] to enhance the treatment of the surface, though not specifically teaching ultrasonication, ultrasonication is a range of vibration frequency. The optimization of the frequency would be obvious to one of ordinary skill in the art.

Warnes does not specifically teach the use of a liquid, however, Schaeffer teaches the use of a "slurry" (col 7, 20-35), thereby suggesting the use of particles within a liquid. One could apply the slurry as taught by Schaeffer with a reasonable expectation of success in treating the surface with alumina particles.

It would have been obvious to someone of ordinary skill in the art at the time of the invention to apply the pretreatment of the surface as taught by Schaeffer and Warnes in the process of Taira because one substituting the alpha-alumina inoculation step of Taira for that of Schaeffer would apply steps in-line with surface treatment for exposing a substrate to a polish.

Regarding claims 8 and 9, Taira teaches sputtering of the layer.

Regarding claim 10, Taira teaches formation of a coating on a base material on which a film is already formed [0005 Embodiment].

Regarding claim 12, Examiner is taking official notice that a cleaning step prior to a treatment and/or deposition step is well known in the art to remove impurities.

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Warnes teaches the reduction of surface active impurities prior to forming an alumina film [0024], though not specifically teaching towards cleaning the surface, is demonstrating concern with the surface condition prior to the alumina film formation.

Regarding claim 13, Taira teaches the process and temperature range.

Regarding claim 14, Taira teaches the optional inclusion of oxygen and therefore there is inherently some level of oxidation of the substrate prior to the completion of the film formation. The claim is open to interpretation as some oxidation occurs prior to the completion of the film or, alternatively, since the sputtering process is used, it is inherent that even if the oxygen gas meets the substrate at the same time as sputtered aluminum, the sputtered aluminum will not have covered the entire substrate.

Regarding claim 15, the particles taught by Schaeffer including particles between 0.3 - 1 micron (col 7, lines 34-35); though Schaeffer's teaching of size is not specific to diameter, the size range taught by Schaeffer is suggestive of the size range of the particles of instant claim. Diameter would be one obvious dimension by which the particles of Schaeffer could be measured..

Regarding claim 16, Taira teaches an example where an alumina film of 300nm is formed [0013], thereby reading on instant range.

Regarding claim 17, the film thickness is a results-effective variable in that for a sputtering process the sputtering time is directly related to the film thickness. While Taira teaches an example of 0.3 microns, examiner holds it to be obvious to apply the process of Taira to produce a thicker film if desired by increasing the sputtering time and thereby makes obvious the claimed range.

Regarding claim 18, all limitations are taught/described above, particularly in reference to claims 1, 9 and 13.

Regarding claim 19, Taira does not teach the flow/pressure of oxygen included, but teaches that it is important to control the ratio of oxygen and inactive gas [0006, bottom], therefore suggesting that the oxygen flow rate/pressure is a results optimizable variable. It would therefore have been obvious to someone of ordinary skill in the art at the time of the invention to optimize the O₂ flow in order to optimize the resulting film.

Claim 1, 4, 5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iyori (6,254,984) in view of Taira (JP2001-342556, English computer translation), Warnes (2003/0022012) and Schaeffer (6,123,997).

Iyori teaches a multi-layer coated member (abstract), which includes a substrate with a coatings of TiAlN containing carbides, nitrides and elements from Groups 4a, 5a and 6a of the periodic table (col 2, lines 15-33). Iyori teaches a process where a substrate is coated with multiple layers and then an alumina film (col 8, line 64 – col 9, line 2). The alumina coating layer may be alpha alumina.

Iyori does not teach the formation of the alpha alumina film on a TiAlN substrate using the process of claim 1.

The teachings of Taira in view of Schaeffer and Warnes r are described above in reference to claim 1 and will not be repeated here. It would have been obvious to someone of ordinary skill in the art at the time of the invention to apply the method of

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forming the alpha alumina film using the method of Taira in view of Schaeffer and Warnes as an effective, operable method of producing a protective alpha alumina layer. Taira particularly refers to the process as having an advantage of being cheap [Field].

Regarding claims 4, 5, and 11, all elements of the claims are taught per the process as described in relation to claim 1 and further by the substrate of Iyori.

Response to Arguments

Applicant's arguments with respect to instant claims have been considered but are moot in view of the new ground(s) of rejection.

Applicants have overcome the rejections over Warnes in view of Schaeffer (pg 6-7 of response); examiner agrees that the pre-oxidation process of the references is not a "deposition" process as required by amended claims.

Applicants argue over the application of Taira to Warnes in view of Schaeffer. Applicants argue that the "Taira does not disclose or suggest depositing the alumina film mainly in the alpha crystal structure" (pg 8, 3rd paragraph), examiner disagrees. As noted in the action, the purpose of Taira's process is to deposit by sputtering an alumina film particularly of the alpha phase. It is agreed that Taira does not disclose treating the surface with a ceramic powder, though Taira was not applied for that purpose.

Arguments over Iyori are directed to the previous rejection, which, as noted, has been overcome by amendment. Iyori teaches the formation of an alpha alumina film on a substrate meeting certain claim requirements; examiner holds the position that it

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would be obvious to form the film of Taira in view of Schaeffer and Warnes as an obvious/effective alternative to the process of Iyori.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSEPH MILLER JR whose telephone number is (571) 270-5825. The examiner can normally be reached Mon - Thurs, 7am to 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/JOSEPH MILLER JR/
Examiner, Art Unit 1792

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792